Claims 1-16, and more specifically claim 1, stand rejected under 35 U.S.C. 112, second paragraph as being indefinite. Applicants respectfully traverse. This rejection does not appear to recognize the distinction between "1/2 the charge" and "1/2 of a maximum quantity of charge that is injected to the liquid crystal display element corresponding to a pixel when the switching element is turned on." The Examiner appears to assert in this rejection that 1/2 the charge of a conventional device is equivalent to "1/2 of the maximum quantity of charge" that may be injected into a liquid crystal according to the present invention. Such is not necessarily the case. Applicants submit that the text from claim 1 cited by the Examiner is clear in light of the Specification to the present Application, and therefore this outstanding Section 112 rejection is respectfully traversed. Reconsideration and withdrawal are respectfully requested.

Claims 1 and 3 stand rejected under 35 U.S.C. 102(e) as being anticipated by Okada et al. (U.S. 6,177,968). Applicants respectfully traverse this rejection because the cited reference does not disclose (or suggest) that the spontaneous polarization of the liquid crystal has a magnitude of not more than 1/2 of a maximum quantity of charge that is injected to the liquid crystal display element corresponding to a pixel when the switching element is turned on, as in claim 1 of the present invention.

Okada discloses a conventional liquid crystal display ("LCD") which reduces the load capacity required for a TFT by utilizing a panel structure in which an accumulative capacitance is provided in series with respect to the liquid crystals, such that the charge of the

LCD is reduced to 1/2 of the charge required in a conventional panel structure. And while it is true that Okada discloses a switching electric charge Q_B which realizes a value of 1/2 of that in a conventional electrode structure (see Column 16, Lines 20-22), nowhere does Okada *require* that Q_B must be 1/2 of such an undisclosed amount. Okada is otherwise silent regarding a maximum quantity of charge injected to the LCD element corresponding to the pixel when the switching element is turned on.

In contrast, claim 1 of the present invention recites, among other things, that the spontaneous polarization of the liquid crystal is a magnitude of not more than 1/2 of the maximum quantity of charge that is injected to the LCD element corresponding to a pixel when the switching element is turned on. Okada neither discloses nor suggests such a feature as in the present invention, and the Examiner appears to have not given this feature of the present invention full and proper consideration.

The Examiner's implication that the relative term "1/2" does not reflect relative to another element of the present invention is unfounded. The "1/2" cited by the Examiner specifically refers to "1/2 <u>of a maximum quantity of charge</u>," as recited in claim 1 of the present invention. Applicants respectfully request that the Examiner give full consideration to this clear and specific claim language as recited. Furthermore, Applicants also respectfully request that the Examiner give full consideration to the modifying term "maximum quantity of charge," which appears to have been erroneously interpreted by the Examiner as being equivalent to the charge seen in any conventional device. Such an interpretation contradicts

the clearly recited claim language of claim 1 of the present invention, as well as the written description to the Specification of the present invention.

Lastly, Applicants submit that the Examiner's assertion that for "ferroelectric liquid crystals, 1/2 the charge is required to exhibit switching as compared to conventional liquid crystals" is based on an erroneous reading of Okada. Okada makes no such requirement. Okada only claims to *realize* a switching electric charge Q_B of 1/2 of that found in conventional structures. Such a claimed *advantage* can hardly be considered a requirement for all such devices. In fact, the only requirement Okada teaches is the requirement for the electric charge Q_B itself, but not any specific value for the charge Q_B. And even if Okada could be properly read to require such a limitation for its own device, such a self-imposed limitation cannot be properly imposed against the novel device of the present invention. Accordingly, the Section 102 rejection based on Okada is respectfully traversed.

Claims 2, 5-7, 9-11, and 13-15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Koden et al. (U.S. 5,465,168) in view of Okada. Applicants respectfully traverse this rejection for at least the reasons discussed above in traversing the rejection of independent claim 1 of the present invention. The cited claims all depend either directly or indirectly from independent claim 1, and therefore include all of the features of the base claim, plus additional features. Moreover, Koden fails to address the specifically recited feature of the present invention which relates the spontaneous polarization of the liquid

crystal with the maximum quantity of charge injected to the LCD element. Accordingly, for at least these reasons, the Section 103 rejection based on a combination of Koden with Okada is respectfully traversed.

Moreover, neither of the cited references, whether taken alone or in combination, addresses the distinctive features and advantages of the present invention. The present invention features that the magnitude of spontaneous polarization of a liquid crystal is not more than 1/2 a maximum quantity of charge injected to the LCD element corresponding to the pixel when the switching element is turned on. This advantageous feature of the present invention allows for the development of materials that can better cope with restricted driving voltages, such as those experienced when a driver IC or the like is employed. This novel feature also allows the present invention to realize a lower driving voltage so that material properties, such as spontaneous polarization and/or relative dielectric constant, can be better prescribed. Neither of the two cited references realizes such advantages results, alone or in combination.

Applicants submit that the novel and advantageous features of the present invention are even further supported by the strong correlation between a holding rate obtained from a change in a pixel potential and the equation (Q-2Ps)/Q (where Q represents a quantity of charge injected to the LCD element per unit area, and Ps represents a spontaneous polarization per unit area), in a driving operation by a switching element of a liquid crystal having spontaneous polarization. As such, the present invention allows a switching element,

such as a TFT, to drive with a low voltage a liquid crystal having spontaneous polarization and excellent response. When applied to an LCD device utilizing a color filter, the present invention would further advantageously realize a quicker response than would a conventional device, or those cited in the prior art of record. One skilled in the art is apprised that quicker response time is particularly advantageous, and especially in regard to display of moving pictures on an LCD device.

The advantages of the present invention become even further distinguished when applied to an LCD device utilizing a field sequential method. With such a device, the present invention is capable of realizing a display exhibiting a finer image quality, a quicker response time, and a higher purity of color than that of the prior art.

The reduction in driving voltage realized by the present invention achieves even further advantages. The reduced driving voltage permits the use of existing driver ICs, which typically utilize lower levels of power, and thereby allows for cost savings in the manufacture of such a device. A reduced driving voltage furthermore also reduces the overall power consumption of a device utilizing the LCD device. One skilled in the art is well apprised that reduced power consumption is very important for devices such as portable computers, for example, which are known to use LCD devices. Such devices are known to have limited battery/power life. Accordingly, for at least these additional reasons, the Section 103 rejection based on the combination of Koden and Okada is respectfully traversed.

Claims 4, 8, 12, and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,642,214) in view of Okada. Applicants respectfully traverse this rejection for at least the reasons discussed above in traversing the rejection of independent claim 1. These cited claims all depend either directly or indirectly from claim 1, and therefore include all of the features of the base claim, plus additional features. Moreover, Ishii is cited merely for the teaching of the use of separate light sources, and is otherwise silent regarding a maximum quantity of charge injected to the LCD element, or its relationship to the spontaneous polarization of a liquid crystal. Furthermore, Ishii fails to realize or address the distinct features and advantages of the present invention discussed above in traversing the rejection based on the combination of Koden and Okada. Accordingly, the Section 103 rejection based on a combination of Ishii and Okada is respectfully traversed.

For all of the foregoing reasons, Applicants submit that this Application, including claims 1-16, is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted

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